

SHAPE MEMORY DEVICE HAVING TWO-WAY CYCLICAL  
SHAPE MEMORY EFFECT DUE TO COMPOSITIONAL  
GRADIENT AND METHOD OF MANUFACTURE

ABSTRACT OF THE DISCLOSURE

A comparatively high vacuum pressure method of manufacturing two-way shape memory effect devices produces devices having a compositional gradient through the thickness of a film of shape memory alloy. The shape memory alloy film exhibits two-way shape memory effect, which is useful for fabricating cyclical actuating devices without need of a biasing mechanism. Examples of shape memory alloys include Ni:Ti-, Au:Cd-, Fe:Mn:Si- and Cu:Ni:Al-based binary, ternary and higher order alloys. Three-dimensional devices may be mass produced using the shape memory alloy and process.